

A Watershed Conditions Report For the State of Kansas HUC 10290104 (Marmaton) Watershed



Kansas Environmental Leadership Program Class in Rock Creek, Near Fort Scott

**Kansas Department of Health & Environment
Bureau of Water
Watershed Management Section
1000 SW Jackson
Topeka, KS 66612**



Watershed Conditions Report For HUC 8 10290104 (Marmaton)

Prepared by
Kansas Department of Health and Environment (KDHE)
Nonpoint Source Section
12/21/00

EXECUTIVE SUMMARY

This Watershed Conditions Report is designed to serve as a water quality “atlas”, and is intended to provide stakeholders in water quality with a tool to assess the condition of water resources within their watershed. Surface water quality for HUC 8 10290104 streams and rivers is generally fair to poor with more than half of the surface water bodies not supporting their designated uses. The primary water quality concern within HUC 8 10290104 streams and rivers is lack of dissolved oxygen (DO). DO levels can be lowered by a number of environmental factors including high water temperature and nutrient enrichment.

There are several small city and county lakes within HUC 8 10290104. The primary pollutant concern for lakes within the watershed is eutrophication. Eutrophication is a natural process which creates conditions favorable for algae blooms and excess plant growth. This process is often accelerated by excess nutrient loading from the watershed.

Groundwater resources in HUC 8 10290104 include the Ozark aquifer and alluvial aquifers of the Marmaton River and its tributaries. Water from these aquifers is generally in good condition with naturally occurring minerals and nitrate as the primary pollutant concerns.

PURPOSE

The Watershed Conditions Report is designed to serve as a water quality “atlas” for a given watershed, and is intended to provide Watershed Stakeholders Committees (WSC) with a tool to assess the condition of water resources within their watershed.

BACKGROUND

The Clean Water Act mandates that States assess the quality of their waters and implement Total Maximum Daily Loads (TMDLs) for water bodies that do not meet their designated uses. The following is a summary of steps taken by the State of Kansas to comply with these requirements of the Clean Water Act.

The Kansas Department of Health and Environment (KDHE) prepared the Kansas Unified Watershed Assessment in 1998. This assessment classifies the State’s watersheds into four categories. A Category I classification means the watershed is in need of restoration due to having water quality impairments or degradation of other natural resources related to an aquatic habitat, ecosystem health and other factors related to aquatic life resources. Category II watersheds are in need of protection. Category III are watersheds with pristine or sensitive aquatic system conditions on lands administered by federal, state, or tribal governments. Category IV watersheds are those for which there is insufficient data to make accurate classification. KDHE has assigned a restoration priority score to each Category I watershed.

As mandated by section 303(d) of the Clean Water Act, lakes and streams within the Category I watersheds, which do not meet water quality standards, are published biannually in the 303(d) list. Subsequently, lakes and streams which appear on the 303 (d) list are scheduled to have a Total Maximum Daily Load (TMDL) prepared. KDHE is currently preparing TMDLs for impaired stream segments located within the highest restoration priority watersheds.

To restore water quality within the Category I watersheds, KDHE recommends the implementation of a Watershed Restoration and Protection Strategy (WRAPS). The ultimate goal of the WRAPS process is to create and implement a plan to restore the health of water bodies that do not meet their water quality standards. Additionally, the WRAPS process will insure that water bodies that currently meet their water quality standards are protected.

KDHE recommends that the WRAPS process be implemented on a local level by a Watershed Stakeholders Committee (WSC). The WSC would have the responsibility of working with local and state agencies to develop a WRAPS plan. This plan should identify the following: public outreach methods; required monitoring activities based on water quality goals and outcomes; specific water quality problems; watershed coordinator/evaluator; actions to be taken to achieve water quality goals and outcomes; schedule for implementation of needed restoration measures; and funding needs.

Streams and Rivers

HUC 8 10290104

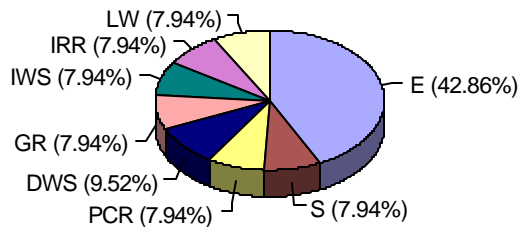
The Huc 8 10290104 watershed is ranked seventeenth in priority for watershed restoration throughout the state. According to the Unified Watershed Assessment, 61.6% of the total stream miles of water in this watershed do not meet their designated uses. The majority of this watershed is drained by the Marmaton River and its tributaries. See Attachment 1 for a map of streams and rivers in HUC 8 10290104.

Designated Uses

According to the Kansas Surface Water Register, the most common designated uses for streams and rivers in this watershed are aquatic life support and domestic water supply. There are 15 public water supplies within the watershed, many of which draw water from the Marmaton River and its alluvium.

Figure 1

HUC 10290104 Surface Water Uses



pS=Special Aquatic Life Use Water
pE=Expected Aquatic Life Use Water
pFP=Food Procurement
pDWS=Designated for domestic water supply.
pGR=Designated for ground water recharge.
pLW=Designated for livestock watering use.
pIRR=Designated for irrigation use.
pPCR=Designated for contact recreational use.

TMDL/Contaminate Concerns

Streams and rivers throughout Kansas have been sub-divided into segments. By dividing the streams and rivers into segments they can be better analyzed and understood. A reach of river or stream may have segments which vary greatly in water quality, based on surrounding land uses.

As mandated by the Clean Water Act, surface waters not meeting their designated uses will require total maximum daily loads (TMDLs). Figure 2 shows that almost 44% of the stream/river segments sampled need TMDLs. As shown in Figure 3, some of the primary pollutant concerns of this watershed's streams and rivers are low dissolved oxygen (DO) levels, eutrophication (E), ammonia (NH₃), and nutrients. Of these pollutant concerns, low DO is by far the most prevalent. DO levels can be lowered by a number of environmental factors including high water temperature and organic enrichment. In the water column, DO is a function of temperature, atmospheric pressure, biological and chemical oxygen demands, biological rates of production and consumption by living organisms within the water column, and aeration due to turbulence and flow.

Figure 2

Percentage of Stream/River Segments

Needing TMDLs

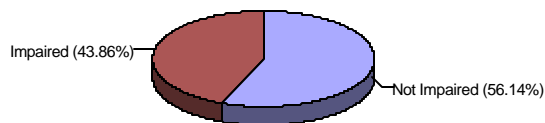
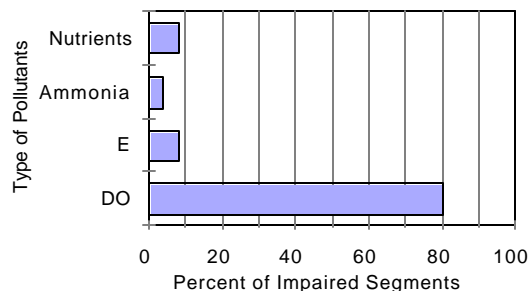


Figure 3

TMDL Distribution



Potential Pollution Sources

As previously stated, low DO levels can be caused by a number of environmental factors. In Kansas, high water temperatures can often accelerate DO loss. Many Kansas streams are bordered by a limited amount of riparian area. These riparian areas are vital for shading streams and rivers, which helps lower the water temperature and increase DO levels. DO levels can also be lowered by excess amounts of nutrients found in the water column. Nutrients can come from a number of sources including waste water treatment plants, confined animal feeding operations, septic systems, row crop agriculture, urban/suburban development, and wildlife.

Below is a list of the land use in this watershed. Grassland is considered grazingland for livestock.

p Urban Area....2%	p Wooded area....12%
p Row Crop....28%	p Water area.... .1%
p Grassland....57%	

Feedlots: In Kansas, confined animal feeding operations (CAFOs) with greater than 300 animal units must register with KDHE. Waste disposal practices and waste water effluent quality are closely monitored by KDHE for these registered CAFOs to determine the need for runoff control practices or structures. Because of this monitoring, registered CAFOs are not considered a significant threat to water resources within the watershed. A portion of the State's livestock population exists on small unregistered farms. These small unregistered livestock operations may contribute a significant source of fecal coliform bacteria and nutrients, depending on the presence and condition of waste management systems and proximity to water resources.

Wastewater Treatment Facilities: There are approximately 18 municipal and industrial wastewater treatment facilities within the watershed (this number may be dated and subject to change). These facilities are currently regulated by KDHE under National Pollutant Discharge Elimination System (NPDES) permits. These permits determine the maximum amount of pollutants allowed to be discharged to the "waters of the State". Due to the chlorination processes involved in municipal waste treatment, these facilities are not considered to be a significant source of fecal coliform bacteria; however they may be a significant source of nutrients.

Septic Systems: There are currently hundreds of septic systems within the watershed and this number is increasing. When properly designed, installed, and maintained, septic systems can act as an effective means of wastewater treatment. However, poorly maintained or “failing” septic systems can leach pollutants into nearby surface waters and groundwater. The exact number of failing septic systems within the watershed is unknown; however the number may be increasing due to the current trends in suburban development. Local Environmental Protection Programs and county health departments provide excellent sources of information regarding the proper design, installation, and maintenance for septic systems.

Wildlife: Wildlife located throughout the watershed are not usually considered a significant source of nonpoint source pollutants. However, during seasonal migrations, concentrations of waterfowl can add significant amounts of fecal coliform bacteria and nutrients into surface water resources.

Row Crop Agriculture: As stated above, approximately 28% of the watershed’s land is used for row crop agriculture. Row crop agriculture can be a significant source of nonpoint source pollution. Common pollutants from row crop agriculture include sediment, nutrients, pesticides, and fecal coliform bacteria. Many producers within the watershed regularly implement and maintain BMPs to limit the amount of nonpoint source pollutants leaving their farm. Some common BMPs include: the use of contour plowing; use of cover crops; maintaining buffer strips along field edges; and proper timing of fertilizer application.

Urban/Suburban Runoff: Many urban landscapes are covered by paved surfaces including roads, driveways, parking lots, and sidewalks. These surfaces are impermeable and tend to divert water into storm drains at high velocities. This increased flow velocity from urban areas can cause severe stream bank erosion in receiving water bodies. Additionally, urban and suburban runoff may carry other pollutants like petroleum hydrocarbons and heavy metals. Currently, the watershed is about 2% urban. Limiting paved surfaces is the key to slowing urban nonpoint source pollution. The use of grass swales, open spaces, and storm water retention ponds are recommended to slow runoff in urban areas.

The watershed has an increasing population living in suburban areas. Residential landscapes are often designed with large turf areas which require high amounts of water and chemicals to maintain. The use of excessive amounts of fertilizers and lawn care chemicals in residential areas can contribute a significant amount of pollution to nearby water resources. Suburban nonpoint source pollution can be limited by: using less lawn fertilizers and chemicals; control of construction sites; proper disposal of pet waste; establishing large areas of native vegetation; and conserving the amount of water use for plant maintenance.

Lakes & Wetlands

Huc 8 10290104 is the home to Bone Creek Reservoir as well as many smaller lakes. Many of the lakes are used for recreational purposes such as camping and fishing but for the most part they are used for food procurement and aquatic life support. Some of the smaller lakes in the watershed include Bourbon County State Fishing Lake, Rock Creek Lake, Fort Scott Lake, and Elm Creek Lake. See Attachment 2 for a map of lakes in HUC 8 10290104.

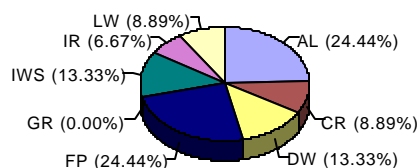
Designated Uses

According to the Surface Water Register, the majority of the lakes and wetlands in this watershed are designated for expected aquatic life use, food procurement, and recreational purposes.

Figure 4

HUC 10290104 Lake Uses

pAL=Aquatic Life Use.
pIWS=Irrigation Water Supply use.
pE=Expected Aquatic Life Use
pCR=Designated for contact recreational use.
pFP=Food Procurement
pGR=Designated for ground water recharge.
pLW=Designated for livestock watering use.
pDW=Domestic Water Supply.

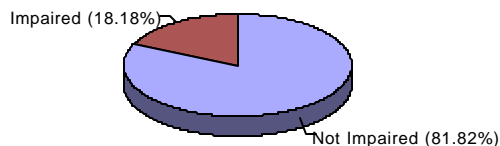


TMDL/Contaminate Concerns

Approximately 18% of the lakes sampled in this watershed need TMDLs (see Figure 5). The primary pollutant concern for these impaired lakes is eutrophication. Eutrophication is caused by excess nutrients from a variety of nitrogen and phosphorous sources including row crop agriculture, feedlots, septic systems, and urban/suburban runoff.

Figure 5

Percentage of Lakes/Wetlands Needing TMDLs



Potential Pollution Sources

Nutrients can come from a number of sources including waste water treatment plants, confined animal feeding operations, septic systems, row crop agriculture, urban/suburban development, and wildlife. Based on this watershed's land uses, it appears that row crop agriculture and livestock grazing may be significant sources of excess nutrients; however urban/suburban development and septic systems may also contribute significant amounts of nutrients.

Groundwater

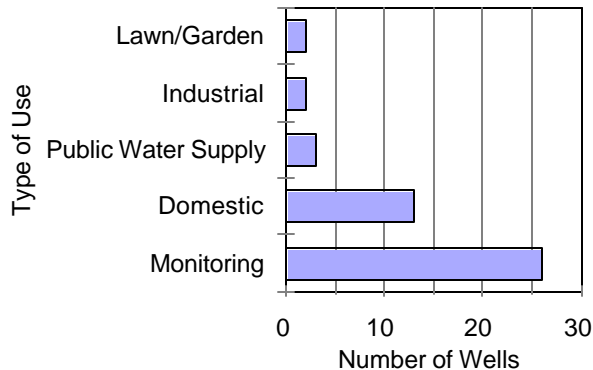
Major groundwater aquifers underlying this watershed include the Ozark aquifer and alluvial aquifers of the Marmaton River and its tributaries. See attachment 4 for a map of groundwater aquifers.

Designated Uses

There are approximately 47 groundwater wells located within the watershed. Water from these wells is used for groundwater monitoring, domestic use, public water supply, industrial use, and lawn and garden.

Figure 6

Groundwater Well Uses



Aquifer Characteristics

Alluvial Aquifer: Alluvial aquifers of the Marmaton River and its tributaries exist throughout the watershed. Alluvial aquifers provide the primary water source for many public water supplies located within the watershed. Water quality in alluvial aquifers is generally good; however nitrates, minerals, pesticides, and bacteria can be pollutant concerns.

Ozark Aquifer: The majority of the watershed is underlain by the Ozark aquifer. The Ozark aquifer is funneled through a complex groundwater flow system caused by the karst features of the Ozark Plateaus. This aquifer can be easily contaminated via losing streams and sink holes. These contaminants can then be carried quickly along channel, fractures, and conduits that may lead to wells or springs.

Potential Pollution Types and Sources

Common groundwater pollutants include: nitrates, chloride, sulfates, bacteria and atrazine. Nitrate impaired groundwater is perhaps the most prevalent groundwater contamination problem in the State.

Nitrate: Nitrate is a naturally occurring compound and is an essential component of all living matter. However, high concentrations of nitrate in drinking water can cause adverse health effects including “blue baby” syndrome. Sources of nitrate include municipal waste water treatment plant discharges, runoff from livestock operations, leaching of fertilizer from urban and agricultural areas, and failing septic systems.

Chloride: Chloride is a naturally occurring mineral found in Kansas lakes, streams, and groundwater. In high concentrations, chloride can cause deterioration of domestic plumbing, water heaters, and municipal water works. The primary source of chloride impacted groundwater is intrusion of salt water from deeper formations, due to improperly constructed water wells which allow confined aquifers to come into contact with each other.

Bacteria: Fecal coliform bacteria are found in the digestive systems of warm blooded animals. In the environment coliform bacteria is an indicator of potential disease causing organisms. Potential sources of bacteria contamination in groundwater include livestock facilities, septic systems, pets, and wildlife. Many wells are impacted by bacteria due to improper construction which allows water from the surface to funnel directly into the well.

Ammonia: Ammonia is a chemical which is toxic to fish and aquatic organisms. Sources of ammonia are livestock, septic tanks, fertilizer, municipal and industrial waste.

TSS: TSS stands for Total Suspended Solids which are particles such as soil, algae, and finely divided plant material suspended in water. Sources of TSS are soil erosion from cropland, stream banks, or construction sites, and municipal and industrial waste.

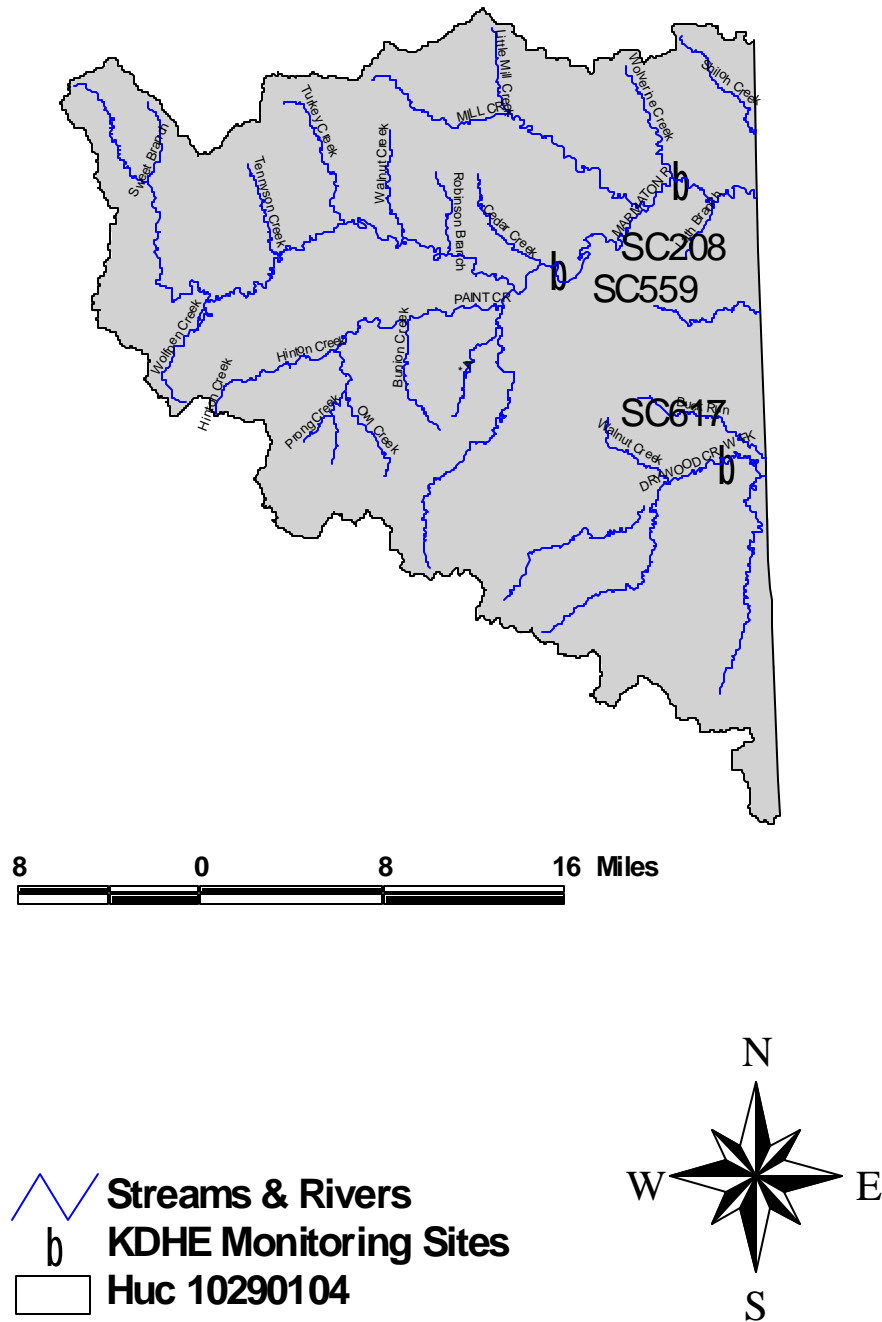
VOCs: Volatile Organic Compounds, also called purgeable organics, are components of fuels and solvents. They are ingredients in many household and industrial products. Sources of VOCs are leaking fuel storage tanks, trash dumps, and some agricultural pesticides.

Manganese: Manganese is a naturally occurring element and causes an unpleasant taste in drinking water, stains porcelain and laundry, and collects deposits in plumbing. It is naturally occurring throughout the soils in the state.

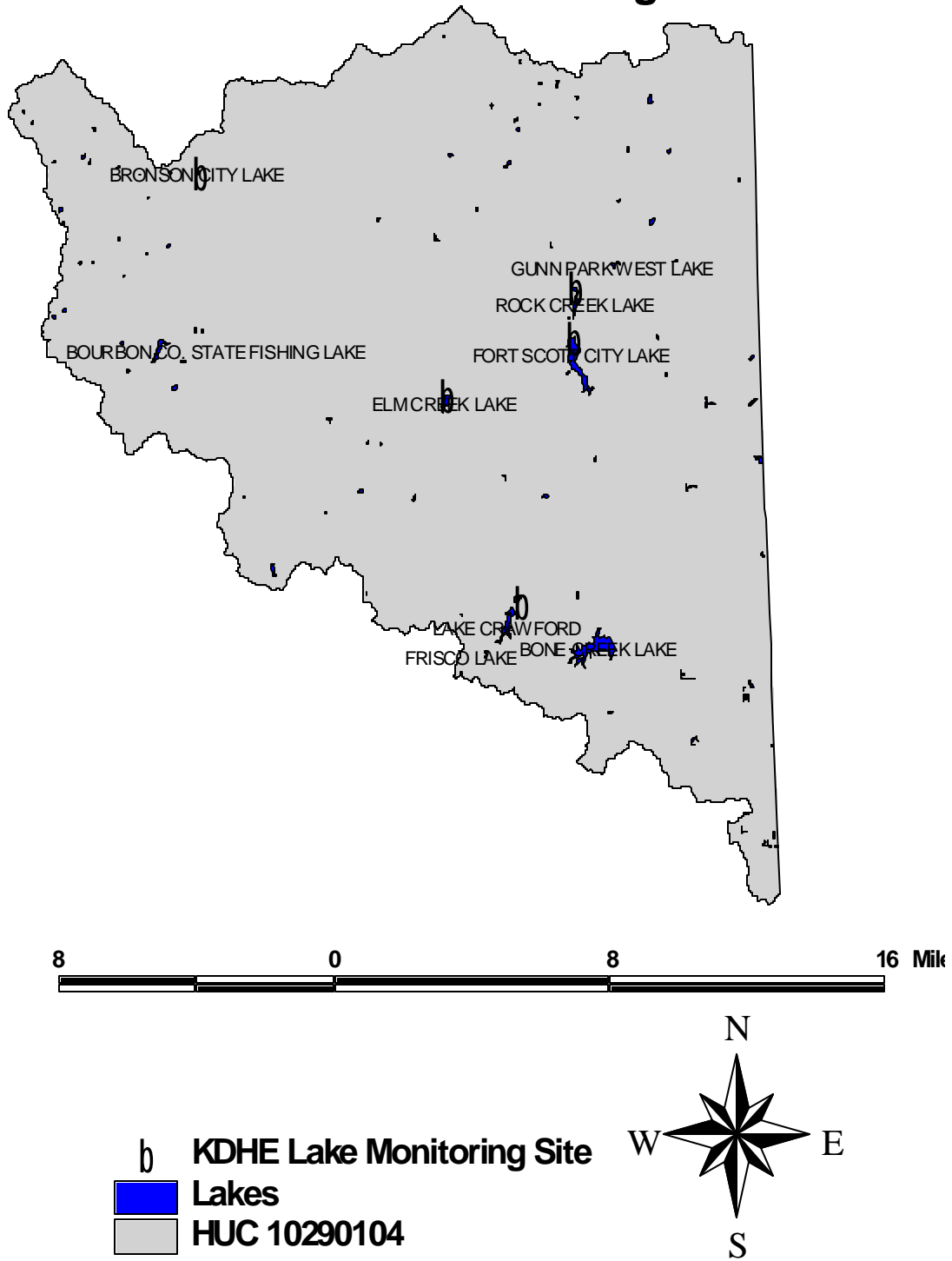
Attachment 1

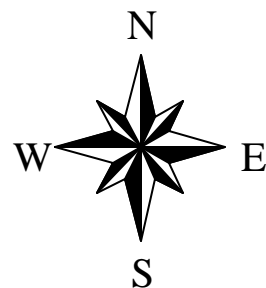
Maps

Huc - 10290104 - Marmaton Streams & Rivers

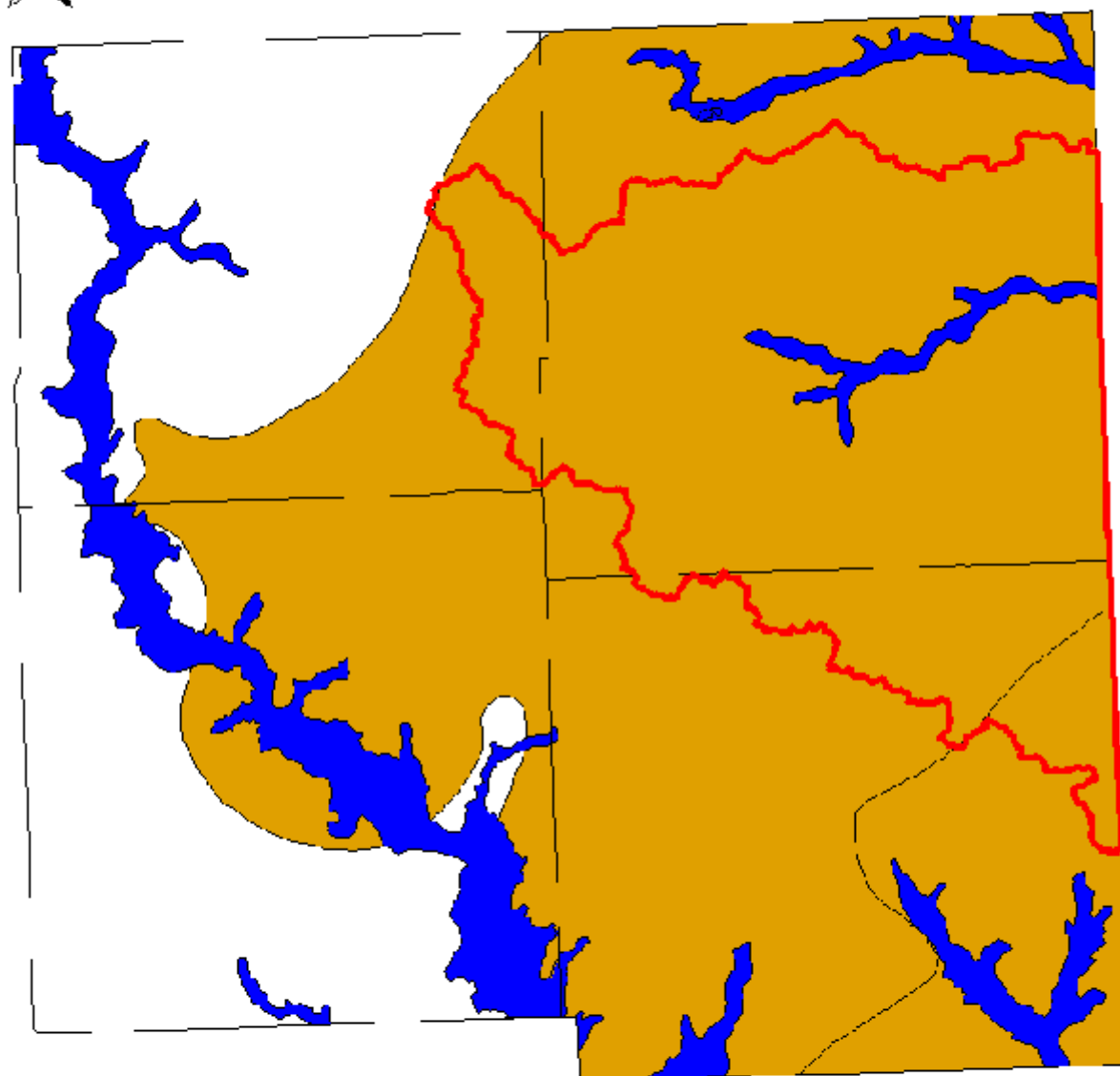


Huc - 10290104 - Marmaton Lakes and KDHE Monitoring Sites





Huc 8 10290104 Marmaton Groundwater Aquifers



10 0 10 20 Miles

- Watershed Boundary
- County Boundary
- Alluvial Aquifer
- Ozark Aquifer

KDHE
Bureau of Water
19 November 2001
Jaime Ziesenis